Review of the West and Central Africa Sorghum Research Network (WCASRN), (1985-1994)*

by

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March, 1994

* Presented at the SPAAR/CORAF workshop on Regionalization of Research in West and Central Africa/CORAF Annual Meeting, Banjul, the Gambia, March 14-18, 1994. The information contained in this paper was obtained from several sources including the previous network Coordinator's reports, monitoring tour reports, SAFGRAD reports etc., available in the WCASRN office at WASIP-Mali.

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Background

The first regional sorghum workshop sponsored by SAFGRAD/USAID/ICRISAT was held in Ouagadougou, Burkina Faso from 27-30 November 1984. It was attended by a total of 46 participants from 16 countries. There were also representatives from ICRISAT, IRAT, INSAH/CILSS, and SADCC/ICRISAT. The idea of a regional approach to sorghum improvement was discussed and approved. NARS representatives agreed that ICRISAT should coordinate the West and Central Africa Sorghum Network (WCASRN). WCASRN became operational in 1985 when a Steering Committee was formed. The Committee consisted of representatives from NARS as members and representatives from several regional organizations as observers.

WCASRN consists of 17 member countries: Benin, Burkina Faso, Cameroon, Central African Republic, Côte d'Ivoire, The Gambia, Ghana, Guinea, Guinea Bissau, Mali, Mauritania, Niger, Nigeria, Senegal, Sierra Leone, Chad, and Togo. Between 1986 and 1991, during Phase II of SAFGRAD (a component of the Scientific Technical and Research Commission (STRC), USAID provided a grant of 3.1 million dollars to SAFGRAD for both the WCASRN and the Eastern African Sorghum and Millet Network.

An amount of 1.6 million dollars of the grant was sub-contracted to ICRISAT. The execution of the project by ICRISAT was carried out from Ouagadougou up to June 1988 with the provision of a Coordinator. In 1989 ICRISAT's sorghum program was reorganized and moved to Bamako as WASIP-Mali and the coordinator was transferred together with the team. At the end of SAFGRAD Phase II, USAID financed a transition period between September 1991 and December 1992 with further extension without financial implications until March 1993. The activities of WCASRN came to an end at the expiry of the grant for the transition period.

In May 1993, at the request of USAID-Washington, ICRISAT submitted a proposal for another transition phase (October 1, 1993-September 30, 1995) of the WCASRN. This proposal was finalized in consultation with IER and INSAH and sent to Washington on May 1993. The proposal was revised following comments received from USAID/Washington and re-submitted in July 1993. In September 1993, CGAIR received a grant of $ 3.379,828 from USAID to fund collaborative Research Networks in East and West Africa. ICRISAT's share of the grant was $ 400000 to support the West and Central Africa Sorghum Research Network from 30 September 1993 to 29 September 1994.

At the SPAAR meeting held in Paris in January 1994 it was agreed that the INSAH/IER initiated Sorghum Pole and the WCASRN should join their efforts to organize sorghum research harmonization workshop in Bamako with financial contribution from the pole and ICRISAT. At a meeting in Bamako on 22 January 1994 attended by ICRISAT's Executive Director, ICRISAT's representative in Mali and the Directors General of IER and INSAH, it was agreed that Dr. A. K Toure, head of IER's sorghum programme coordinates the pole and WCASRN during the period, until September 1994. It was also agreed that ICRISAT recruits an Administrative Assistant to be based at WASIP-Mali, Samanko, a Secretary and a Driver.

The sorghum research planning workshop for both the pole and the network was organized on February 21-25 in Bamako. Representatives from 14 of the 17 countries in West and Central Africa as well as observers from ICRISAT (ISC, Kano and Mali), CIRAD and ILCA attended the workshop. A steering committed was elected and a programme of research, training and technology exchange activities was established.

Objectives of the Network

The purpose of the USAID grant was to address the sorghum improvement problems of West and Central Africa by concentrating on problems and constraints having regional significance, and by establishing the necessary links with national, regional and international institutes to serve the entire region effectively. The specific objectives of the Network are:

a) To increase the production of sorghum, thereby contributing to the stabilization of food supplies in the region and contributing to improved nutrition and income for farmers in the drier areas of the region;

b) To assist and strengthen national sorghum improvement programs, and contribute to their research needs in all agroecological semi-arid zones;

c) To develop improved varieties and hybrids and agronomic/management practices capable of giving higher and more stable economic yields in the semi-arid environments;

d) To organize and promote systematic regional testing of available and improved genetic material and technology in the semi-arid zone;

e) To facilitate the development of agricultural research manpower among West Africa national at all levels; and

f) To organize regional workshops and monitor uniform yield trials through field inspections.

Implementation Strategy

The activities of the Network are organized and implemented around seven main areas:

- Training
- Regional trials and nurseries
- Research projects
- Monitoring tours
- Regional workshops
- Visits to NARS.
- Steering Committee meetings

TRAINING ACTIVITIES

Three major training activities were undertaken involving a total of 18 participants from 13 countries over the period, 1986 to 1993.

Striga Training Workshop

The first training workshop was on *Striga* control and was held in Ouagadougou, Burkina Faso, from 5 to 10 October, 1987. There were 12 participants from the following 11 countries: Burkina Faso, Cameroon, Gambia, Ghana, Kenya, Mali, Niger, Nigeria, Sudan, Togo, an Uganda. Two participans came from Uganda. In addition to ICRISAT scientists, specialists from IRAT, Sudan and Old Dominion University assisted in the training.

Training Workshop on Agronomic Research and On-Farm Testing

This workshop was held in Bamako, between 9 and 29 September, 1989. Nine out of ten countries invited were represented. The representative from Central African Republic was absent. The countries invited were Central African Republic, Côte d'Ivoire, Gambia, Ghana, Guinea, Guinea Bissau, Mauritania, Niger, Nigeria, Senegal, and Sierra Leone. There was a total of 11 lectures and five field visits. Lecture topics ranged from soil fertility, control approaches to *Striga*, and crop and animal interaction to principles of on-farm testing. Field visits included a trip to the Cinzana research station some 270 km from Bamako, the national program at the Sotuba station just outside Bamako, a special *Striga* field trip to Katibougou, about 70 km north of Bamako, and trials of ICRISAT's West African Sorghum Improvement Program (WASIP) at the new site at Samanko, 25 km from Bamako.

Crop Protection In-service training

One participant each from Chad, Côte d'Ivoire and Senegal attended an in-service training for 10 days each at ICRISAT/WASIP-Mali in 1991. The participants received training and updated their skills in the areas of Striga, entomology and pathology.

REGIONAL TRIALS AND NURSERIES

Five types of regional collaborative multi-locational trials were conducted by the network. They were:

1. The West African Sorghum Variety Adaptation Trial, early duration (WASVAT-E).

2. The West African Sorghum Variety Adaptation Trial, medium duration (WASVAT-M)

3. The West African Sorghum Hybrid Adaptation Trial (WASHAT)

4. The West African Sorghum Disease Resistance Nursery (WASDRN)

5. The West African Sorghum *Striga* Trial (WASST).

The varietal and hybrid trials were started in 1986, the disease nursery in 1987 and the *Striga* trial in 1988. The Coordinator multiplied and dispatched seeds for all the trials except those of the hybrid trial. Hybrids for WASHAT were multiplied and dispatched by WASIP-Nigeria.

Whereas in 1986 all the test varieties in WASVAT-E, WASVAT-M, and WASHAT were contributed by ICRISAT, in 1991, 73, 53 and 11% of the test varieties, respectively, were from NARS. Similarly, NARS contributed no varieties to the disease nursery and only 9% to the *Striga* trial in 1988. By 1991, 43 and 100% of the varieties for the disease and *Striga* trials, respectively, were from NARS. A total of 206 varieties were tested in the four trials (two WASVATs, WASDRN and WASST) between 1986 and 1992, and 89 hybrids between 1986 and 1991.

The majority of the highest yielding varieties in the two varietal trials, WASVAT early and medium duration, were ICRISAT varieties. Yields in these varieties ranged from 1.90 to

3.66 t ha^{-1}. However, varieties contributed by NARS were among the four highest yielding entries. For example, Nagawhite from Ghana was the highest yielding variety in WASVAT-early in 1987 (2.80 t ha^{-1}) and in 1988 (3.55 t ha^{-1}. It became a "standard" control in future years. In 1990, CE 196-7-2-1 from Senegal and CS 85 from Cameroon were the highest yielding varieties in WASVAT early and medium, respectively, with yields of 2.53 and 2.09 t ha^{-1}, respectively.

ICRISAT developed the hybrids for the regional trials (WASHAT). However, in 1989 the national program of Niger contributed two hybrids and they were included in WASHAT for 1990 and 1991. One of the hybrids from Niger, Tx 623 A x MR 732, was among the four highest yielding entries in 1989. Yields of the four best hybrids between 1986 and 1991 ranged from 2.64 to 3.71 t ha^{-1}.

Entries in the disease nursery (WASDRN) were considered resistant if their mean disease severity score across locations (MDSL) was ≤ 3.0, and moderately resistant if their MDSL was between 3.1 and 3.5. the scores were based on a 1-6 scale. Only leaf anthracnose and gray leaf spot occurred in sufficiently high levels of infection in all locations between 1987 and 1991. During this period a total of 15 and 35 varieties were identified as either resistant or moderately resistant to leaf anthracnose and gray leaf spot, respectively.

With respect to the *Striga* trial (WASST), the same entries were tested for three years between 1988 and 1990. Two varieties, IS 9830 and ICSV 1007 BF had relatively low *Striga* infection in 1988 and 1989. ICSV 1001 BF (Framida) was the only variety with low *Striga* counts in both 1989 and 1990. Five of the six resistant varieties for 1990 had not been identified as resistant in 1988 and 1989. A new set of entries were evaluated in 1991 and the following seven lines had low *Striga* counts: CS 54 X Djigari, CS 141, CS 95, CS 54, IS 15823, S 35, and IS 1260.

At the eighth steering committee meeting held on 3 and 4 December 1990, six promising varieties tested in WASVAT early and medium were selected for further observation in NARS. Accordingly, 50g each of ICSV 1083 BF, ICSV 111 IN, CE 180-33, ICSV 1063 BF, ICSV 1089 BF and Malisor 84-1 were sent to 11 NARS in May 1991,

together with a technical information bulletin. Collaborators were requested to grow the six varieties in at least three locations in their respective countries and fill out a technical information bulletin.

The Coordinator received requests from Mauritania early in 1992 and more recently from Ghana for seeds of Nagawhite and ICSV 16-5 BF, respectively. Between 10 and 20kg of Nagawhite and 2kg of ICSV 16-5 BF were requested. Nagawhite was developed by the national program of Ghana, whereas ICSV 16-5 BF is an ICRISAT variety.

RESEARCH PROJECTS

The network funded four research projects that were conducted in Burkina Faso, Niger, Mali Cameroon and Nigeria. The projects and their objectives were:

i) Anthracnose project

The project was conducted in Burkina Faso with the objective of identifying sources of resistance to anthracnose and to determine if local races (pathotypes) of the anthracnose fungus exist.

ii) Long smut project

The objectives of the project on long smut were to develop effective inoculation techniques and to screen sorghum germplasm from the Niger national program and from other national programs in the Network for resistance to long smut. It was conducted in Niger.

iii) Head bug project

The head bug project was conducted in Mali and had as its objectives the following:

- to determine the zones in Mali with high head bug infestation in farmers' fields;

- to evaluate the economic importance of head bugs in the different zones in which sorghum is grown in Mali;

- to study the biology of the insect;

- to develop a regional nursery for the study of stable resistance in sorghum head bugs.

iv) *Striga* project

The project on *Striga* was on screening of sorghum germplasm from Cameroon and other countries against *Striga hermonthica* under heavily infested field conditions. The major objective of the *Striga* project was to identify suitable sources of resistance in sorghum to *Striga*. Other objectives included the identification of a suitable screening methodology and multilocational testing of resistant genotypes identified from the project.

v) Wheat-Sorghum Composite flour project

Nigeria conducted the composite flour project. The objectives were:

- to develop a technology for producing acceptable local wheat-sorghum composite bread and confectionery, aimed at increasing the sorghum component as high as possible;

- to test the developed technology for wheat-sorghum composite bread and confectionery in industrial pilot plants;
- to test the new technology in selected commercial bakeries;

- to determine the acceptability in Nigerian markets of bread and confectionery produced from wheat-sorghum composite flour.

MONITORING TOURS

In 1986, six scientists from Benin, Central African Republic, Gambia, Mauritania, Nigeria and Senegal visited national programs in Cameroon, Gambia, Nigeria and Senegal from 23 September to 6 October, 1986. The visiting national scientists were able to exchange views on sorghum production problems, and the on-going research programs in the countries visited.

Five scientists from the national programs of Ghana, Guinea Bissau, Mali, Niger and Sierra Leone also visited the research stations located at Kamboinsé, Saria and Farako-Ba in Burkina Faso during 13-16 October 1986 to observe breeding material, experimental varieties and hybrids.

In 1987, eleven representatives from the national programs of Benin, Burkina Faso, Cameroon, Chad, Cote d'Ivoire, Gambia, Niger, Nigeria, Senegal, Togo and Mali visited Burkina Faso. The participants monitored sorghum research activities in the national program, and the on-going ICRISAT's research work.

In 1989, a monitoring tour was organized between 9-18 October, 1988 in which representatives of Benin, Burkina Faso, Cameroon, Guinea, Mali, Chad and Togo visited Mali, Burkina Faso and Niger. They visited national, regional and international trials and nurseries at Sotuba, Samanko and Cinzana in Mali, Farako-Ba and Saria in Burkina Faso, and Lossa, Tillabery and Maradi in Niger.

Finally in 1991, a "mini" monitoring tour was organized between 10 and 12 October 1991. Scientists from Niger, Nigeria and Chad visited the national program of Mali.

REGIONAL WORKSHOPS

Four regional sorghum workshop were held between 1984 and 1993. The first workshop in 1984 in Ouagadougou gave birth to the WCASRN. The second regional workshop was held in Bamako, Mali from 21-24 October, 1985. This workshop was attended by 47 scientists from 15 countries. Representatives from ICRISAT, IRAT, INSAH/CILSS, SAFGRAD, INTSORMIL, and TROPSOIL also attended. During this workshop, a steering committee was

formed. The third, was held in Maroua, Cameroon from 20-23 September, 1988. It was attended by 52 participants from 14 countries. It was also attended by representatives from IRAT, ICRISAT, and SAFGRAD. A total of 33 technical papers were presented. The fourth was held in Niamey between 7 and 14 March, 1991 as part of the Inter-Network Conference for all of SAFGRAD' Networks. Twenty representatives from 15 NARS participated in the sorghum section of the conference. In addition, there were 16 other participants from various regional and intercontinental organizations, including seven principal staff and five research assistants from WASIP-Mali, ICRISAT Bilateral Program in Mali and WASIP-Nigeria. During the joint session of all the Networks, three scientific papers were presented from the Sorghum Network. In the separate sorghum Network session, 10 scientific papers and 15 country reports were presented. Recommendation groups on agronomy, breeding, plant protection, and sorghum utilization were formed.

VISITS TO NATIONAL PROGRAMS

Steering committee members assisted the Coordinator in visiting NARS. During each of these visits, information was collected based on Terms of Reference for Visits to National Programs developed by the Network. These included information on manpower.

STEERING COMMITTEE MEETINGS

A total of 11 steering committee meetings were held between 1986 and 1993. The meetings were held at Burkina Faso, Cameroon, Mali and Niger.

SOME SIGNIFICANT ACHIEVEMENTS

From the results of the Regional adaptation and disease trials, a number of promising varieties from member countries are currently at different levels of use in other member countries. For example CSM 388 and Malisor 84-1 from Mali are in pre-release stages in Guinea and Senegal respectively. ICSV 1063, 401 IN, 111 IN and 16-5 BF from ICRISAT are similarly in pre-release stages in Côte d'Ivoire, Mali and Ghana. Other varieties are already in the farmers fields, or being further tested on-farm. Over 200 varieties have been tested, and the

levels of use in the different countries are summarized in Table 1. Table 2 summarizes the results of the research projects conducted in five member countries, and individual projects are summarized below:

Anthracnose Project

The project on anthracnose used the composite spreader row technique to screen a total of 80 sorghum lines, of which 56 were local varieties and 24 were introduced genotypes. Seventy-four out of the 80 lines tested were resistant (mean score of 3 or less in a 1-6 scale) to the foliar stage of the disease. Of the six susceptible lines, four were introduced genotypes. Only one introduced genotype was susceptible to stem infection. Grains of 30 out of the 80 lines were free of the fungus. The level of grain contamination by the anthracnose fungus *C. graminicola* was higher in introduced genotypes. Nineteen local and three introduced varieties were identified as having a rate reducing-like resistance to leaf anthracnose. Also, 16 local and nine introduced varieties were resistant to the stalk phase of the disease. Thirty-six locals and seven introduced varieties had 10% or less of their grains contaminated with the anthracnose fungus.

Long Smut Project

Attempts were made to develop a suitable artificial inoculation technique to screen for the disease. Only one or two sori developed on three plants 20 days after inoculating several plants using three forms of inoculation techniques. Eleven out of 75 genotypes were highly resistant (score of 0, on a 1-4 scale) to long smut from natural inoculum. The results further showed a positive correlation between infection and the maturity cycle of the genotypes tested. Late maturing genotypes were more susceptible. In another experiment, 24 out of 57 sorghum lines tested were identified as resistant, based on infection from natural inoculum at two locations. The longevity of the teliospores of the long smut fungus under laboratory conditions was increased when stored dry, as compared to storage under humid conditions. In preliminary pot experiments, infection (number of sori) was much higher when plants were inoculated with basidiospore (sporidia) compare to teliospore.

Head Bug Project

Results from the head bug project in Mali indicated that the population of *Eurystylus marginatus* was more abundant towards the end of September and October. Early planting resulted in no attack by *E. marginatus*, whereas two generations of the insect developed in late planted sorghums. In a screening experiment 25 out of 100 lines were resistant to *E. marginatus*. Further lines were identified in an advance trial and in an international trial. A limited survey in farmers' fields revealed that in certain localities, *E. marginatus* attack was higher in introduced lines than in locals. However, the level of attack depended on the locality. Some local varieties were severely attacked in some areas. A further 21 lines out 51 were identified as resistant in a preliminary nursery. The resistance of nine sorghum varieties identified in preliminary nurseries for two years, was confirmed by artificial inoculation.

Striga Project

Based on counts 20 days after sowing, 14 lines in two separate trials had relatively low *Striga* infection ($\leq$ 10 per m^2). All 12 entries in the 1991 and 1992 *Striga* regional trial came from the *Striga* project.

Wheat-Sorghum Composite Flour Project

Major progress made after the first year included the identification of Farafara as the most suitable sorghum variety for wheat-sorghum composite bread and confectionery. In the laboratory, acceptable bread can be produced with up to 50% level of wheat substitution by sorghum. Also, acceptable confectionery can be produced with up to 60% level of sorghum substitution. In general, it would appear that composite bread was lower in volume and had a shorter shelf life than 100% wheat bread. Incorporation of a small fraction (0.50%) of cassava starch flour to the composite flour produced bread which was more spongy, closer textured and less crumbling. However, cassava shortened the shelf life of the bread. In addition, the nutritional status of the wheat-sorghum bread was lower than that of pure wheat bread. With the limited sales undertaken, wheat-sorghum composite bread appeared popular, especially among low income groups, probably because it was more filling than pure wheat bread.

DIFFICULTIES AND SHORTHCOMINGS

Regional Trials

The quality of the results needs to be improved. The notebooks containing the results are received too late and thus the preparation of the annual progess report is also delayed. More and more NARS are requesting funds for the conduct of these trials. It is not known how the absence of funds for these trials have affected the level of management of the trials. Another difficulty has been that the results from these trials have not been widely distributed to the NARS. Almost always the French versions of these results and of the annual progress report do not exist. The reason for this latter problem is given below. Since the inception of the varietal and hybrid trials, no stability analysis test (genotype x interaction) has been carried out. Systematic monitoring and more intensive evaluation of promising lines from these trials by NARS only started in 1991. A systematic procedure by the Network to get NARS to use these lines in their programs should have been developed, For example, separate multiplication and distribution of the seeds to breeding programs of the NARS. A number of varieties received from NARS for the 1990/91 off-season multiplication as entries in the 1991 trials either did not germinate or did not flower. In other cases, seeds were received too late for multiplication. In the latter case, the affected NARS were asked to furnish enough seeds from their stock. These arrived late, which in turn delayed the dispatch of the trials.

Translation of Reports and Other Networks Documents

Thirteen of the 17 NARS in the Network are French speaking, yet more than 90% of the documents from the Network are in English. Although the Steering Committee has approved the recruitment of an individual on an ad hoc basis for this purpose, the availability of person competent enough is a bottleneck. The present bilingual administrative secretary can type reports and other documents written in English directly into French. Perhaps, all documents should be produced in French in the first instance and then translated into English as and when it is necessary.

Visits to NARS

The size of the Network, with 17 countries, creates a problem with respect to annual visits by the Coordinator. Even if half of these countries are visited per year, it takes a lot of time to travel and to effectively interact with officials and the NARS scientists during the limited period when the crop is going through its maturitity cycle -heading to physiological maturity. Thus, visits to NARS by the Coordinator have not been as frequent as it should be.

Training

Enough emphasis has not been given to training. During the period under review, only three short-term training programs were conducted.

Research projects

The project on *Striga* in Cameroon was started one year later than the other projects. There were logistic and technical difficulties with the project on long smut in Niger during the first year.

Financial Accountability

Whereas financial accountability from lead NARS where the research projects were conducted had been satisfactory, that from the 12 non-lead NARS need improvement. After reminders, financial reports were eventually received and for the most part without supporting documents. However, it should be recognized that it is sometimes difficult to get specific receipts for small purchases especially if they are made at less established shops or workplaces.

WCASRN RECENT DEVELOPMENTS

The WCASRN was re-funded by USAID for a period of 1 year (30 September 1993 to 29 September 1994). In February, a workshop was organized jointly by ICRISAT and INSAH/IER at Bamako where representatives of 14 of the 17 West and Central Africa met

and identified constraints to sorghum production and research opportunities to alleviate them. The workshop identified biotic and abiotic as well as socio-economic constrains affecting sorghum production in the region, and proposed a total of 12 research projects to be conducted in the three agro-ecological zones. The Steering Committee (see Annexe) selected 4 projects out of the 12 to undertake in the 1994 season. They include i) the multiplication and testing of promising sorghum varieties ii) integrated pest management iii) maintenance of soil fertility and iv) analysis of climatic risks.

ACKNOWLEDGEMENT

This report could not have been prepared within the short period of time without access to a large volume of reports prepared by the former network coordinator, Dr. M.D. Thomas. I also appreciate the contribution of Ibrahima Sissoko, and Mme Bintou Samake, former network secretary.

Table 1. Utilization by NARS of germplasm tested in regional trials and nurseries of WECASORN between 1986 and 1992[1]

Country/variety	Level of use	Year	Total ha
1. Guinea (Conakry)			
ICSV 16-5 BF	FF	91-92	0.7
84 W 848	FF	91-92	0.7
IS 3443	FF	91-92	0.7
CSM 388	PR	92	55
Malisor 84-1	ST	90-92	0.2
Malisor 84-5	ST	90-92	0.2
Framida	ML	90-92	1.5
BF 83/48-2-1	FF	92	0.7
90 W 190	FF	92	0.7
2. Senegal			
F2-20	R	89	-
CE 180-33	PR	92	5
CE 196-7-2-1	FF	90	-
ICSV 1171 BF	FF	91	-
CE 315-14-1-1	FF	92	-
ICSV 1089	FF	91	-
CS 95	FF	92	-
Sepon 82	CR	91	-
ICSV 1163 BF	CR	90	-
ICSV 111 IN	CR	91	-
CS 54	CR	92	-
3. Côte d'Ivoire			
Framida	DM	88	0.25
Malisor 84-1	PR	91	0.5
ICSV 1063 BF	PR	91	0.5
ICSH 507	ST	90	0.25
4. Mali			
ICSV 401 IN	PR		-
ICSV 1063 BF	PR	-	-
ICSV 1079 BF	CR	-	-
ICSV 1089 BF	CR	-	-
ICSV 1078 BF	CR	-	-
ICSV 1002 BF	CR	-	-
		-	-
5. Mauritanie			
Nagawhite	CR	90	-

Table 1. Continued

Country/variety	Level of use	Year	Total ha
6. Togo - 1			
ICSV 1079 BF	CR	89	-
ICSV 1078 BF	CR	89	-
Sepon 82	CR	89	-
S-34	CR	90	-
S-35	CR	90	-
Framida	CR	90	-
E 35-1	CR	90	-
CS 54	CR	90	-
CS 61	CR	90	-
CS 95	CR	90	-
Malisor 84-1	CR	92	-
ICSV 1049 BF	CR	91	-
ICSV 1063 BF	CR	91	-
ICSV 1007 BF	CR	91	-
ICSV 1002 BF	CR	91	-
7. Togo - 2			
ICSV 1089 BF	ST	91-92	-
CE 180-33	ST	91-92	-
ICSV 1063 BF	ST	91-92	-
ICSV 1083 BF	FF	91-92	-
ICSV 111 BF	ST	91-92	-
Malisor 84-1	FF	91-92	-
Framida	FF	87	-
8. Ghana			
ICSV 111 IN	PR	90	60
ICSV 16-5 BF	PR	90	-
S 219	ST	91	-

1. Based on responses from a questionnaire. FF = Farmer's fields; PR = Pre-release; ST = On-Station; ML = Multilocation; R = Released; CR = in crosses; DM = Demonstration; ICRISAT varieties with prefixes ICSV, 84 or 90. E 35-1, Framida, IS 3443 contributed by ICRISAT. All others from NARS.

Table 2. Significant results on a yearly basis from WECASORN's research projects.

Project Project	Country	Year started	Significant results	
			Cropping season	Results
1. Anthracnose	Burkina Faso	1989	1989	1. Identified 74 out of 80 lines screened as resistant to foliar infection.
				2. Grain of 30 lines were free of the fungus. Grain contamination was higher in introduced varieties.
			1990	1. The resistance to foliar infection observed in 1989 was confirmed in 70 lines.
				2. A total of 44 lines, all local varieties, were resistant to leaf, stem and grain infection.
				3. Disease progress more rapid in introduced varieties.
			1991	1. Identified 19 local varieties and three introduced varieties with rate reducing-like resistance to leaf infection.
			1990	
2. Long smut	Niger			1. Eleven out of 75 varieties screened were highly resistant.
				2. Late maturing varieties were more susceptible.

Table 2. continued.

Project	Country	Year project started	Significant results	
			Cropping Season	Results
			1991	1. New sets of 24 varieties identified as resistant at two locations.
				2. Longevity of teliospores of the long smut fungus was increased when stored dry.
3. Head bugs				3. Infection was higher when plants were inoculated with sporidia than with teliospores
	Mali	1989	1989	1. Population of the head bug insect was high at the end of September and October.
				2. Early planting resulted in no attack, whereas two generations developed in late planted sorghums.
			1990	3. Twenty-five out of 100 lines were resistant.
			1991	Results obtained in 1989 were confirmed.
				1. Identified 21 new sources of resistance out of 51 lines screened in a preliminary nursery.
				2. The resistance of nine varieties identified in 1989 and 1990 were confirmed by artificial inoculation.

Table 2. continued.

Project	Country	Year project started	Significant results	
			Cropping season	Results
4. *Striga*	Cameroon	1990	1990	The project multiplied eight varieties and two germplasm lines resistant to *Striga*, for entries in regional *Striga* trial.
			1991	1. Fourteen lines with low *Striga* counts identified.
				2. All 12 entries in the *Striga* regional trial came from the project.
5. Wheat-sorghum flour[a]	Nigeria	1989		1. Local Farafara variety identified as most suitable sorghum variety for the composite flour.
				2. Upto to 50% substitution of sorghum for bread and upto 60% for confectionery.
				3. Addition of 0.5% Cassava starch flour to the composite flour produced more spongy bread, closer textured and less crumbling, but shelf life was shortened.
				4. Wheat-sorghum composite flour bread more popular among low income group because it was more filling than pure wheat bread.

a. Work was not carried out according to cropping season.

Annexe

Personnel of the WCASRN (1985-1994)

C.M. Patanayak, ICRISAT Team Leader and Coordinator, WCASRN (until August 1988)

K.V. Ramaiah, Ag Team Leader, ICRISAT and Acting WCASRN Coordinator, (August 1988-May 1989)

M.D. Thomas, WCASRN Coordinator, (May 1989-March 1993)

A.B. Touré, WCASRN Coordinator and Sorghum Pole Coordinator (from February 1994)

Composition of Steering Committee

1986-1990

S. Da	member	Burkina Faso
O.P. Dangi	member	Cameroon
D. Yagoua	member	Chad
M.D. Traoré	member (Chairman)	Mali
J.W. Clark	member	Niger
C.C. Nwasike	member	Nigeria
M.D. Thomas	member (Coordinator)	ICRISAT

1990-1993

M.D. Traoré	Mali (Chairman)
S.Da	Burkina Faso
O.P. Dangi	Cameroon
J.W. Clark	Niger
O. Nwasike	Nigeria
Y. Djekounkosse	Chad
M.D. Thomas	Coordinator

1994

O. Niangado	Mali (Chairman)
A.B. Touré	Mali (Coordinator)
S. Da	Burkina Faso
Y. Djekounkosse	Chad
K.A. Elemo	Nigeria
D. Yovo	Benin
I. Magagi	Niger

1994-03

Review of the West and Central-Africa Sorghum Research Network (WCASRN), 1985-1994

Debrah, S.K.

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